Data Quality Record for Long-Term Performance Goals

Long-Term Performance Goal Text: By September 30, 2026, improve measured air quality in counties not meeting the current National Ambient Air Quality Standards (NAAQS) from the 2016 baseline by 10%.

Corresponding Annual Performance Goal: Percentage of air quality improvement in counties not meeting current NAAQS.

Goal Number/Objective: Goal 4/Objective 4.1

NPM Lead: Office of Air and Radiation (OAR)

1a. Purpose of Long-Term Performance Goal:
The purpose of this long-term performance goal (LTPG) is to show progress in reducing pollutant concentrations in counties not meeting one or more current National Ambient Air Quality Standards (NAAQS) relative to the 2016 calculated baseline. An upward trend indicates improvement.

1b. Performance Measure Term Definitions:
The Clean Air Act requires EPA to set the NAAQS for six "criteria" pollutants considered harmful to public health and the environment. These national standards form the foundation for air quality management. This measure is presented as the aggregate percent change in design value concentrations – a statistic that describes the air quality status of a given location relative to the NAAQS – since the baseline year. The aggregate percent change is weighted by the number of counties violating for each pollutant in the baseline year which means that more weight is given to pollutants with more violating counties. Four criteria pollutants – ozone (O_3), fine particulate matter ($PM_{2.5}$), PM_{10} (inhalable particles, with diameters that are generally 10 micrometers and smaller), sulfur dioxide (SO_2), and lead (Pb) – are included in this LTPG. All counties in the United States met the NAAQS for carbon monoxide (CO) and nitrogen dioxide (NO_2) in 2016, so those two pollutants are not considered in this LTPG.

1c. Unit of Measure:
Since this LTPG is based on design value concentrations among several pollutants with varying units, the unit of measure is normalized to an aggregate percent change.

2a. Data Source:

- The original data source for this measure is EPA's Air Quality System (AQS).
- The Clean Air Act requires that state, local, and tribal air pollution control agencies monitor the air for ambient levels of certain pollutants. The monitoring agencies are required to report the measured data, along with metadata about the site and monitoring equipment and associated quality assurance data to AQS. The requirements for the monitoring program are codified in 40 CFR Part 58.
- Air quality monitors typically measure ambient concentrations hourly or daily, depending on the type of monitor and the criteria pollutant.

- EPA regulations give reporting organizations (states, tribes, and local agencies) 90 days following the end of a calendar quarter to submit their data to AQS. For Quarter 4 data, reporting organizations have until the end of Quarter 1 (March 31) in the next year to submit to AQS. Agencies also have until May 1 to certify their data for the previous year.
- This LTPG uses design value concentrations – a statistic that describes the air quality status of a given location relative to the NAAQS – which are computed using data retrieved from AQS following May 1 to allow time for data to be submitted and certified.
- Following review by EPA Regional offices, the design value concentrations are posted on the Air Quality Design Values page on EPA's Air Trends website.

2b. Data needed for interpretation of (calculated) Performance Result:

	Baseline # of Counties	Percent Change Improvement Targets from 2016 Baseline								
		2017	2018	2019	2020	2021	2022	2023	2024	2025
Ozone	117	1	2	3	3	4	5	6	7	8
PM2.5	14	0	1	1	1	1	2	2	2	3
PM10	23	2	2	3	3	4	4	4	5	5
SO2	12	3	5	8	10	13	16	18	21	23
Pb	5	20	36	46	57	66	73	78	83	86
Aggregate Percent Change		2	3	4	5	6	7	8	9	10

3. Calculation Methodology:

Overview:

The following section describes how the baseline and targets were established, as well as how the annual updates are calculated.

The baseline for this LTPG is the air quality in counties that did not meet the NAAQS for one or more criteria pollutants in 2016. There were no counties violating the CO or NO_2 NAAQS in the baseline year. Therefore, those pollutants are not included in this LTPG. For ozone and $PM_{2.5}$, targets are based on predictions of future year concentrations resulting from the Community Multi-Scale Air Quality model which estimates the impact of existing and future control strategies. For the other pollutants (PM_{10}, SO_2, and Pb), such modeling predictions are unavailable. Therefore, targets for those pollutants are based on a regression curve using historical data. The results for this LTPG are updated annually based on design values computed from actual monitored concentrations.

Target Development:

(1) Determined baseline counties (those not meeting the NAAQS in 2016) using the official 2016 design value reports on the Air Quality Design Values page.

(2) Retrieved historical design values as follows:

a. For ozone, $PM_{2.5}$, and SO_2, 1990-2016 design values were retrieved from AQS.

b. For Pb, historical design values that integrate all relevant Pb measurements were not available in AQS at the time of baseline development. Therefore, the 10-year trend (2007-2016) of county-level design values from the official 2016 design value report on the Air Quality Design Values page was used.

    c. For PM_{10}, concentration-based design values were not available in AQS at the time of baseline development. Therefore, concentration-based design values were computed in accordance with the June 1987 PM10 SIP Development Guideline (pp. 6-2 to 6-5) using daily PM_{10} retrieved from AQS for 2000-2016.

(3) For $PM_{2.5}$ and ozone:
    a. For baseline counties, performed linear interpolation out to 2025 for each county having data in 2016 and 2025.
    b. Computed composite average of design values across counties for each year.
    c. Computed percent change from base year to out years.

(4) For PM_{10}, SO_2, and Pb:
    a. Required 75% completeness for SO_2 and PM_{10} as well as 70% completeness for Pb since there are only 10 years of historical data from the official design value report. For SO_2, excluded Hawaii because of high, sporadic design values at the volcano site.
    b. Computed the log of the design values for each county.
    c. Performed linear regression out to 2025 on the log values.
    d. Converted regression predicted log values back to concentrations.
    e. Computed the median of design values among counties for each year. (The median is used because there are relatively few counties, and the trends are not uniform. The average would be heavily influenced by very large values in a single year or a sporadic trend from a single county.)
    f. Computed the percent change from base year to out-years.

(5) Using the percent change for each pollutant, computed the average percent change across all the pollutants, weighted by the number of counties. See table in section 2b.

For Annual Updates, EPA will:

(1) When the annual design value reports become available, retrieve the design values for baseline counties from the Air Quality Design Values page.
(2) For ozone and $PM_{2.5}$, compute the composite average across those counties.
(3) For the other pollutants, compute the median among those counties. (The median is used because there are relatively few counties, and the trends are not uniform. The average would be heavily influenced by very large values in a single year or a sporadic trend from a single county.)
(4) For each pollutant, compute the percent change from the base year.
(5) Compute the average percent change across all pollutants, consistent with the developed target, weighted by number of baseline counties.

Additional Notes:

(1) The design value concentrations do not include data that have been flagged for exceptional events (e.g., wildfires, dust storms, volcanic eruptions, etc.) and concurred by the EPA Regional office.
(2) The data handling conventions are based on the most recent NAAQS for each pollutant.

4. Quality Assurance/Quality Controls:

The quality assurance/quality control (QA/QC) of the national air monitoring data submitted to AQS has several major components: (1) the data quality objective (DQO) process; (2) reference and equivalent methods program; (3) EPA's National Performance Audit Program (NPAP); (4) system audits; and (5) network reviews. More details are available on the Ambient Air Monitoring Quality Assurance page. To ensure quality data, State and Local Air Monitoring Stations (SLAMS) are also required to meet the following QA/QC criteria: (1) each site must meet network design and site criteria; (2) each site must provide adequate QA assessment, control, and corrective action functions according to minimum program requirements; (3) all sampling methods and equipment must meet EPA reference or equivalent requirements; (4) acceptable data validation and record keeping procedures must be followed; and (5) data from SLAMS must be summarized and reported annually to EPA. Finally, there are system audits that regularly review the overall air quality data collection activity for any needed changes or corrections.

5. Data Limitations/Qualifications:
The primary purpose for ambient air quality monitoring is to assess compliance with the NAAQS. Consequently, most monitors are sited in or near areas with high population or areas of maximum pollutant concentration. The county-level design value concentrations used for this measure are computed at each monitoring site and the highest one in each county is used to represent that county, effectively presuming that it is representative of the county.

Actual results for the most recent year could be impacted by exceptional events, like wildfires. As mentioned previously, the design value concentrations used in this measure do not include data that have been flagged for exceptional events and concurred by the EPA Regional office. Since the flagging/concurrence process can take several months, design values for the most recent year could include high values that have not yet been flagged/concurred.

6. Technical Contact:
David Mintz (OAR)

7. Certification Statement/Signature:

I certify the information in this DQR is complete and accurate.

DAA Signature _Original signed by Elizabeth (Betsy) Shaw__ **Date** ___5/10/2022___